

REMARKS

Claims 1-21 were pending in this application, of which claims 20 and 21 have been allowed, claims 15 and 16 have been rejected, claims 17-19 have been made subject to objection, and claims 1-14 have been withdrawn from consideration. Acknowledgement is made with appreciation of the early indication of allowance of claims 20 and 21, and of allowable subject matter in claims 20 and 21.

Upon entry of the following amendments, claims 15-16 will be canceled and claim 17 will be rewritten in independent form by incorporating the subject matter of claims 15 and 16 therein. This places claim 17 in independent form without changing the original scope of the claim. In addition, claims 18 and 21 have been amended to correct informalities. Thus, claims 17-21 remain active in this application. Non-elected and inactive claims 1-14 also have been cancelled. The Examiner is respectfully requested to reconsider and withdraw the outstanding objection(s) and rejection(s) in view of the amendments and remarks contained herein.

OBJECTIONS

An objection has been made to Abstract of the Disclosure as being of improper length and format. Accordingly, the Abstract has been amended as shown in the attached replacement Abstract. In addition, Applicants have amended the title of the invention to more clearly reflect the present invention as set forth in the active claims.

An objection was made to claims 17-19 as dependent upon a rejected base claim. The objection is overcome with the conversion of claim 17 to independent form.

Claims 18 and 21 were objected to because of a typographical error. Accordingly, the term "intake fun" has been changed to --intake fan -- in these claims. In addition, claim 21 has been amended to establish proper antecedent basis for the ventilating unit. These revisions do not narrow the scope of original claims 18 or 21. Likewise, the minor editorial revisions to claims 19 and 20 are not intended to, and are not considered to narrow the original scope of those claims. The form of claims 18-21 has been improved. Applicants respectfully request withdrawal of the outstanding objections.

REJECTION UNDER 35 U. S. C. § 102

Claims 15 and 16 were rejected under 35 U. S. C. § 102(b) as allegedly anticipated by Weaver (U.S. Patent No. 5,846,073). Applicants respectfully submit that this rejection is moot in view of the cancellation of claims 15 and 16. Claim 17 has been rewritten in independent form by incorporating the subject matter of canceled claims 15 and 16 therein. As such, Applicants respectfully request withdrawal of the rejection.

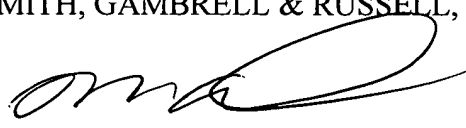
CONCLUSION

Applicants respectfully submit that this Amendment and the above remarks obviate the outstanding objection(s) and rejection(s) in this case, thereby placing the application in condition for immediate allowance. Allowance of this application is earnestly solicited.

If any fees under 37 C. F. R. §§ 1.16 or 1.17 are due in connection with this filing, please charge the fees to Deposit Account No. 02-4300, Order No. 033082M098.

Respectfully submitted,
SMITH, GAMBRELL & RUSSELL, LLP

By:


Michael A. Makuch, Reg. No. 32,263
1850 M Street, N.W., Suite 800
Washington, D.C. 20036
Telephone: (202) 263-4300
Facsimile: (202) 263-4329

Dated: May 20, 2004

Listing of Claims

1. - 16. (canceled)

17. (currently amended) A heat treatment system ~~as set forth in claim 16~~, comprising:

a heat treatment furnace for heat-treating an object to be treated;

a throat which is provided in said heat treatment furnace for carrying said object in and out; and

a cooling mechanism for cooling the vicinity of said throat,

wherein said cooling mechanism comprises a ventilating unit having a ventilating port for sending a cooling fluid toward the vicinity of said throat, and a heat exchanger arranged so as to face said ventilating port in the vicinity of said throat, and

wherein said cooling mechanism further comprises an intake fan for sucking the cooling fluid in the vicinity of said throat over said heat exchanger.

18. (currently amended) A heat treatment system as set forth in claim 17, wherein said cooling mechanism further comprises:

a duct for forming a circulating path for said cooling fluid between said intake ~~fan~~ fan and said ventilating unit so that said cooling fluid sucked by said intake fan returns to said ventilating unit;

a filter, provided in said duct or said ventilating unit, for purifying said cooling fluid which is sent by said ventilating unit; and

an intake port which is formed on said duct at least upstream of said filter so that said cooling fluid sent by said ventilating unit is sucked at a different position from a position at which said cooling fluid is sucked by said intake ~~fan~~ fan.

19. (currently amended) A heat treatment system as set forth in claim 18, wherein said cooling mechanism further comprises a second heat exchanger which is arranged in said duct between said intake port and said filter so as to cool the cooling fluid which is drawn into said duct from said intake fan and said intake port ~~to join~~.

20. (currently amended) A heat treatment system ~~having~~ which is provided with a loading chamber ~~in which~~ has a mechanism for carrying an object to be treated in and out of a throat of a bottom portion of a heat treatment furnace and which ~~has a loading chamber~~ is separated as an airtight region,

wherein said throat of said bottom portion of said heat treatment furnace is arranged above said loading chamber,

said loading chamber including:

a ventilating unit which has a ventilating port in the vicinity of said throat and a filter for purifying and sending a cooling fluid from the ventilating port to the vicinity of said throat from the side;

a first heat exchanger which is arranged so as to face said ventilating port in the vicinity of said throat;

an intake fan for sucking the cooling fluid in the vicinity of said throat over said first heat exchanger;

a circulating duct which forms a circulating path for said cooling fluid between said intake fan and said ventilating unit so that said cooling fluid sucked by said intake fan returns to said ventilating unit, at least a part of ~~said~~ said circulating duct being arranged below said loading chamber;

an intake port which is formed in the part of said circulating duct below said loading chamber so that a part of said cooling fluid sent by said ventilating unit is sucked below said loading chamber; and

a second heat exchanger which is arranged in said circulating duct between said intake port and said filter so that the cooling fluid drawn into said circulating duct from said intake fan and said intake port ~~to join~~ is cooled.

21. (currently amended) A method for cooling a loading chamber which is provided with a mechanism for carrying an object to be treated in or out of a throat of a heat treatment furnace in a heat treatment system and which is separated as an airtight region, said method comprising the steps of:

purifying and sending ~~said~~ cooling fluid to the vicinity of said throat of said heat treatment furnace;

sucking said cooling fluid, which is sent to the vicinity of said throat, over a heat exchanger, which is arranged in the vicinity of said throat, by means of an intake fan to ~~drawn~~

draw said cooling fluid into a duct which is formed as a circulating path for returning said cooling fluid;

sucking said cooling fluid, which is sent by said a ventilating unit, at a different position from a position at which said cooling fluid is sucked by said intake ~~fan~~ fan, by means of an intake port which is formed on said duct; and

cooling said cooling fluid, which is drawn into said duct from said intake ~~fan~~ fan and said intake port ~~to join~~, by means of a second heat exchanger, which is arranged in said duct downstream of said intake port, to return the cooled cooling fluid to said ventilating unit,

wherein said steps are continuously carried out in a process for carrying said object out of at least said throat of said heat treatment furnace.

Replacement Abstract

A heat treatment system and method for cooling a loading chamber that includes a heat treatment furnace for heat-treating an object to be treated. The heat treatment furnace includes a throat for carrying the object in and out, and a cooling mechanism for cooling the vicinity of the throat. The cooling mechanism has a ventilating unit with a ventilating port for sending a cooling fluid toward the vicinity of the throat and a heat exchanger arranged so as to face the ventilating port in the vicinity of the throat. The cooling mechanism also has an intake fan for sucking the cooling fluid in the vicinity of the throat over the heat exchanger. When the object to be treated is carried in, the structure of various mechanisms in the vicinity of the throat is simplified, and space is saved.